

Biosensors: An Analytical Tool for Real-Time Detection of Biological Molecules

Martin Gorge*

Department of Chemical and Biomolecular Engineering, University of Tennessee Knoxville, Knoxville, USA

Commentary

Received: 27-Feb-2023, Manuscript No. JPN-23-92639; **Editor assigned:** 01-Mar-2023, Pre QC No. JPN-23-92639 (PQ); **Reviewed:** 15-Mar-2023, QC No. JPN-23-92639; **Revised:** 22-Mar-2023, Manuscript No. JPN-23-92639 (A); **Published:** 31-Mar-2023, DOI:10.4172/23477857.10.1.001.

***For Correspondence:**

Martin Gorge, Department of Chemical and Biomolecular Engineering, University of Tennessee Knoxville, Knoxville, USA

E-mail: martin@gmail.com

Citation: Martin G. Biosensors: An Analytical Tool for Real-Time Detection of Biological Molecules. RRJ Pharm Nano. 2023;11:001.

Copyright: © 2023 Martin G. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

ABOUT THE STUDY

Biosensors are analytical devices that are capable of detecting and quantifying biological molecules or events. They have found numerous applications in healthcare, environmental monitoring, food safety, and many other fields. Biosensors work by converting a biological response into a measurable signal, such as electrical, optical or thermal. One of the most significant advantages of biosensors is their ability to provide real-time and on-site measurements, which is critical for many applications. For example, biosensors can monitor glucose levels in diabetic patients, detect pathogens in food and measure pollutants in water. Biosensors are also highly sensitive and specific, which means they can detect very low concentrations of target molecules and distinguish between similar molecules.

There are several types of biosensors, including electrochemical, optical, piezoelectric and thermal biosensors. Each type of biosensor has its unique advantages and limitations, and the choice of biosensor depends on the specific application.

Electrochemical biosensors are one of the most widely used types of biosensors. They work by measuring the current or voltage produced by a redox reaction between the biological molecule and an electrode. Electrochemical biosensors are highly sensitive, can detect a wide range of molecules and can be easily miniaturized for portable applications.

Optical biosensors, on the other hand, work by measuring changes in light absorption, reflection, or emission caused by the biological molecule. Optical biosensors are highly specific and can detect very low concentrations of target molecules. They are also suitable for imaging and multiplexing applications.

Piezoelectric biosensors use a piezoelectric crystal that generates an electric signal when subjected to mechanical stress. When a biological molecule binds to the surface of the crystal, it causes a change in the crystal's resonant frequency, which can be measured. Piezoelectric biosensors are highly sensitive and can detect very small amounts of target molecules.

Thermal biosensors measure the heat released or absorbed by a biological reaction using a thermistor or a micro calorimeter. Thermal biosensors are highly sensitive and can detect small changes in temperature caused by the biological reaction. They are suitable for detecting enzyme activities and biomolecular interactions.

Despite their numerous advantages, biosensors also face several challenges. One of the main challenges is the need for reliable and stable biological recognition elements, such as antibodies or enzymes, which can be expensive and difficult to produce. Biosensors also require calibration, quality control and maintenance, which can be time-consuming and costly. Another challenge is the interference from other molecules or environmental factors, which can affect the biosensor's specificity and sensitivity. To overcome this challenge, biosensors may require sample preparation, pre-concentration, or matrix correction methods.

In conclusion, biosensors are powerful analytical tools that have revolutionized many fields, including healthcare, environmental monitoring, and food safety. They offer real-time and on-site measurements, high sensitivity and specificity, and can be easily miniaturized for portable applications. However, biosensors also face several challenges, including the need for reliable biological recognition elements and interference from other molecules or environmental factors. With ongoing research and development, biosensors will continue to play a critical role in advancing science and technology.

This commentary provides an overview of the different types of biosensors, including electrochemical, optical, piezoelectric, and thermal biosensors. The advantages and challenges of biosensors are discussed, highlighting their potential for revolutionizing many fields. With ongoing research and development, biosensors will continue to have a significant impact on science and technology